

# ABSTRACT

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An imaging system for medical and other applications in which the internal structures of an overall object must be seen without invading or damaging the object. The system works by transmitting electromagnetic waves of single or a multiplicity of frequencies through the object (for example the human body) and measuring the absorption and scattering of these waves by the various structures and inhomogeneities of the object, using scanning sub-wavelength resolution detectors. An "X-Ray" type of image can be created by an x-y planar scan of the detectors (and sometimes the source) over the object. A "CAT-Scan" three-dimensional image can be created by a cylindrical (theta-z) scan of the detectors and sources around and along the object. The device uses sensitive detection and scanned apertures to accomplish the transmission and sub-wavelength spatial resolution. Diffraction effects from the structures are compensated in the imaging algorithm software, using several techniques, such as comparison of the data with measured and calculated diffraction patterns for the generic object, and changing the distance of the source and the detector on alternate scans.